

iXM-RS150F Calibration Certificate

In Flight Calibration



Camera system:	iXM-RS150F, Rodenstock RS-50mm
Serial number:	MM010016
Calibration ID	MM010016_50mm_20240201
Manufacturer:	Phase One A/S, Roskildevej 39, 2000 Frederiksberg, Denmark
Certificate issue date	22-03-2024

The camera system is fully functional within the specifications defined by Phase One A/S.

Phase One A/S



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1. Introduction

This document describes the calibration results for the iXM-RS150F camera system with Phase One Rodenstock RS-50mm lens.

The system has been calibrated in flight by the Phase One as described in section 3.

With the signature on the front-page Phase One is assuring the full functionality and accuracy of the system within the specifications defined by Phase One A/S.

It is recommended to recalibrate the system every two years.

2. Calibrated system components

The following table lists the components of the system. Calibration has been performed on a fully assembled system. Disassembly or modification will void the validity of the calibration.

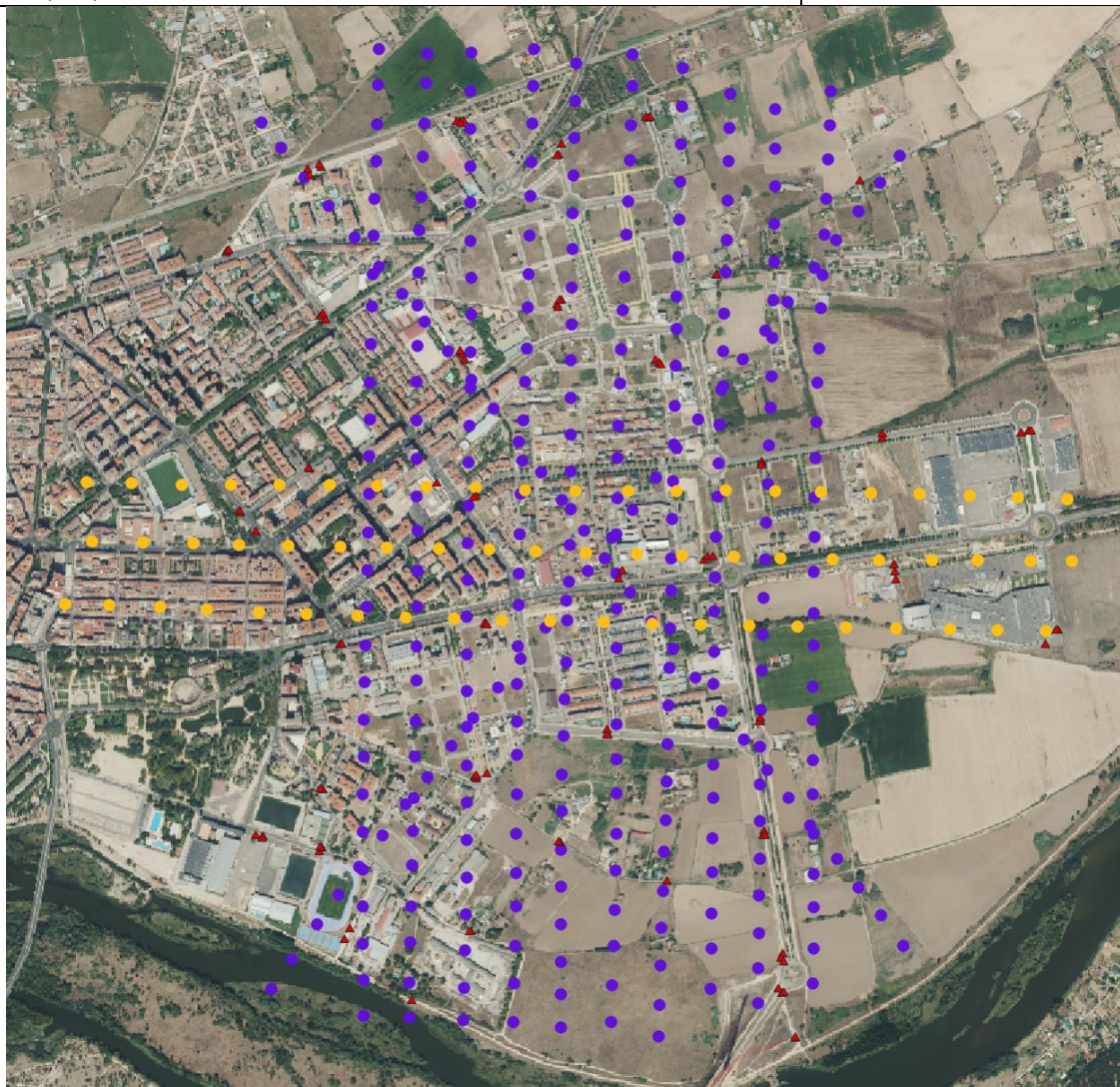
iXM-RS150F	
Serial Number	MM010016
Resolution	150MP
	14204 x 10652
Pixel Size (microns)	3.76
Effective Sensor Size (mm)	83
Light Sensitivity (ISO)	50-6400
Capture Rate (FPS)	2
Spectral characteristics	RGB

Rodenstock 50mm Lens	
Serial Number	12402537
Aperture Range	f/4 – f/22
Shutter Speed Max.	Up to 1/2500 sec
Angle Of View – Long Side	54.6
Angle Of View – Short Side	42.3°

3. Calibration procedure: In Flight Calibration

The camera system has been calibrated in flight calibration procedure. The characteristic of the flight is shown in the next table.

Flight parameters	
Flight date	01-02-2024
Mean GSD (cm)	4.64
Flight altitude (m)	620x620x810
Side/Forward overlap (%)	80/80
Strips	10 x 2 x 3
Number of images	385
Block accuracy	
GCPs	104
RMSE _x (cm)	3.28
RMSE _y (cm)	3.60
RMSE _z (cm)	3.03



4. Calibration Result

Calibration Information (Australis model)

This section presents geometric correction parameters in standard format (*) for input into 3rd party photogrammetric software.

	Value	STD
Focal length C (mm)	51.5235	0.0001
Xp (mm)	-0.0204	0.0001
Yp (mm)	-0.2688	0.0001
K1	1.55160e-05	2.48595e-09
K2	-5.07123e-09	5.12352e-12
K3	7.34877e-13	3.17302e-15
P1	1.04645e-06	4.93312e-09
P2	1.38833e-06	4.12432e-09
B1	-4.54723e-06	2.04609e-07
B2	-2.38736e-05	1.98992e-07

The coefficients follow the model used by the photogrammetric software Australis where the corrected image coordinates (x_{corr} , y_{corr}) can be calculated from the measured coordinates (x_{meas} , y_{meas}) by using the following formulas:

$$x = x_{meas} - x_p$$

$$y = y_{meas} - y_p$$

$$r^2 = x^2 + y^2$$

$$dr = K1 \cdot r^3 + K2 \cdot r^5 + K3 \cdot r^7$$

$$x_{corr} = x + x \cdot \frac{dr}{r} + P1 \cdot (r^2 + 2x^2) + 2 \cdot P2 \cdot x \cdot y + B1 \cdot x + B2 \cdot y$$

$$y_{corr} = y + y \cdot \frac{dr}{r} + P2 \cdot (r^2 + 2y^2) + 2 \cdot P1 \cdot x \cdot y$$

(*) on request specific formats and corresponding files can be delivered.

Image residuals

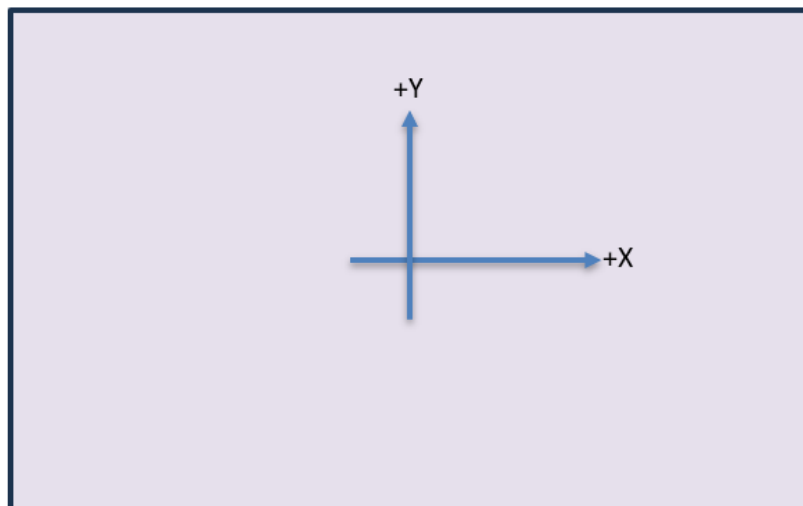
After geometric calibration remaining residuals in image plane have a

- Maximum error of 0.30 pixels
- RMS error of 0.067 pixel



Image Coordinate System

The image coordinate system for an iXM-RS150F camera system is illustrated the next image:



5. Distortion Free Images

iX Process und **iX Capture** offer the possibility to apply all calibration corrections into the image and provide a distortion free output image.

The parameters of a distortion free output are:

<i>Parameter</i>	<i>Value [mm]</i>	<i>RMSE [mm]</i>
Focal length		
C	51.5235	0.0001
Principal point offset		
xp	0.0	0.0001
yp	0.0	0.0001

<i>Parameter</i>	<i>Value</i>	<i>RMSE</i>
Radial distortion		
K1	0	2.48595e-09
K2	0	5.12352e-12
K3	0	3.17302e-15
Radial-asymmetric and tangential distortion		
P1	0	4.93312e-09
P2	0	4.12432e-09
Affinity and non-orthogonality		
B1	0	2.04609e-07
B2	0	1.98992e-07